



**OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK**

**SUPPLEMENTAL TEST BORING PROGRAM
PLANT 2 ABOVE-GROUND TANKS**

Prepared For

Occidental Chemical Corporation

May 1993

LEGGETTE, BRASHEARS & GRAHAM, INC.
Professional Ground-Water and Environmental Services
72 Danbury Road
Wilton, CT 06897

HKR 001 0273

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**OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK**

**SUPPLEMENTAL TEST BORING PROGRAM
PLANT 2 ABOVE-GROUND TANKS**

INTRODUCTION

At the request of the United States Environmental Protection Agency (USEPA), Occidental Chemical Corporation completed two additional test borings, TB-51 and TB-52, at the Hooker/Ruco site. The protocols for completing this program were presented in Occidental Chemical Corporation's (OCC) letter to the USEPA dated October 23, 1992. The locations of the additional test borings are shown on figure 1. The additional test borings were completed on November 5, 1992 to assess soil quality adjacent to the Plant 2 above-ground tanks. Drilling, sampling and analytical procedures were conducted in accordance with the approved Field Operations Plan (FOP), dated August 1989.

FIELD SAMPLING PROGRAM

The test borings were completed to 32 ft bg (feet below grade). Split-spoon samples were collected continuously to 5 ft bg and then at 5-foot intervals to the completion depth of the boring. Copies of the geologic logs for the test borings are presented in Appendix I. Each sample was visually examined and all soil samples were subjected to a headspace screening using a calibrated photoionization detector (PID).

All of the drilling equipment was steam-cleaned between each boring. Soil sampling equipment, including split spoons and homogenizing tools, were cleaned in accordance with the approved FOP. At the conclusion of the drilling program, the test borings were backfilled with a mixture of bentonite and soil cuttings.

Four soil samples were collected and submitted for laboratory analysis. They were collected in each boring at depths of 0 to 2 ft bg and 3 to 5 ft bg. One duplicate soil sample was collected from the 0 to 2 ft bg sample at TB-52, and two field blanks were collected from the soil sampling equipment. The field sampling plan specified that any

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soil sample exhibiting a PID headspace screening result of greater than 5 ppm (parts per million) would be submitted for analysis of TCL VOA's only. All PID readings (presented on the logs in Appendix I) were below 5 ppm. All samples submitted to the laboratory were analyzed for Target Compound List (TCL) and Target Analyte List (TAL) compounds using Contract Laboratory Program (CLP) methodologies. A copy of the chain-of-custody form and the validation summary reports are presented in Appendix II.

ANALYTICAL RESULTS

The analytical results for the soil samples are presented on tables 1 through 4. A complete discussion of the analytical quality control validation program is presented in Appendix II. OCC has reviewed the validation report and finds the data to be acceptable.

The data show that the shallow soils tested (grade to 5 ft bg) contain low levels of polynuclear aromatic hydrocarbons (PAHs), pesticides and PCB's. No volatile organic compounds were detected in the soils tested. The presence of the PAH's is consistent with the results of the RI, during which these compounds were detected in samples from fill material used around tank areas, tank berms and sump backfill (see the Revised RI Report Sections 4.2.4.1 through 4.2.4.10). None of the individual PAH's were detected at levels exceeding 0.5 mg/kg (milligram per kilogram).

PCB's were detected in the soil samples at levels below the site cleanup level of 10 mg/kg.

A number of pesticides were detected in the soils tested at levels of less than 0.006 mg/kg. These results may be false positives due to the detection of PCB's. If present in the soils, they may reflect the past agricultural use of the property.

Bis (2-ethylhexyl) phthalate was detected in three of the soil samples at estimated values of less than 0.5 mg/kg. This compound has been detected in the deep soils beneath Sump 1, as well as in some shallow soils. The soil cleanup objective for the protection of ground-water quality is 435 mg/kg.

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Of the 18 metals present in the soil samples, 17 were detected at levels that are below the To-Be-Considered (TBC) soil cleanup criteria shown on table 5. Mercury was detected in the 0 to 2-foot sample in TB-52 and in the duplicate of that sample at estimated concentrations of 0.12 and 0.31 mg/kg. The TBC cleanup criteria is 0.1 mg/kg.

CONCLUSIONS

The data generated during this program demonstrate that there has been no significant impact on the soils on the south side of Plant 2 in the vicinity of the above-ground storage tanks. The EPA risk assessment (RA) entitled, "Hooker Chemical/Ruco Polymer Site Risk Assessment and Fate and Transport Report (1992)", did not identify any risks to human health from shallow soils at the site. The levels of chemistry detected during this supplemental program are lower than in other areas of the plant, so it is concluded that no risk to human health is posed by these soils. PID readings of the deeper soils were all less than 3 ppm, demonstrating no site-related impacts.

The results of this supplemental testing program confirm the conclusions of the RA and the RI that shallow soils do not have to be addressed in the overall site remedy. These soils will, therefore, not be addressed in the final Feasibility Study.

skd
May 13, 1993
occboring.rpt/93-26

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TABLES

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Table 1 Volatile Results
All Target Compounds
Hooker/RUCO Site
Sampled November 5, 1992

Compound	TB51 0-2' (SS13) ug/kg		TB51 3-5' (SS14) ug/kg		TB52 0-2' (SS15) ug/kg		TB52 0-2' (FIELD DUP) (SS16) ug/kg		TB52 3-5' (SS17) ug/kg	
Chloromethane	ND	11	ND	10	ND	10	ND	11	ND	10
Bromomethane	ND	11	ND	10	ND	10	ND	11	ND	10
Vinyl Chloride	ND	11	ND	10	ND	10	ND	11	ND	10
Chloroethane	ND	11	ND	10	ND	10	ND	11	ND	10
Methylene Chloride	ND	11	ND	10	ND	10	ND	11	ND	10
Acetone	ND	11	ND	10	ND	10	ND	11	ND	10
Carbon Disulfide	ND	11	ND	10	ND	10	ND	11	ND	10
1,1-Dichloroethene	ND	11	ND	10	ND	10	ND	11	ND	10
1,1-Dichloroethane	ND	11	ND	10	ND	10	ND	11	ND	10
1,2-Dichloroethene (total)	ND	11	ND	10	ND	10	ND	11	ND	10
Chloroform	ND	11	ND	10	ND	10	ND	11	ND	10
1,2-Dichloroethane	ND	11	ND	10	ND	10	ND	11	ND	10
2-Butanone	ND	11	ND	10	ND	10	ND	11	ND	10
1,1,1-Trichloroethane	ND	11	ND	10	ND	10	ND	11	ND	10
Carbon Tetrachloride	ND	11	ND	10	ND	10	ND	11	ND	10
Vinyl Acetate	ND	11	ND	10	ND	10	ND	11	ND	10
Bromodichloromethane	ND	11	ND	10	ND	10	ND	11	ND	10
1,2-Dichloropropane	ND	11	ND	10	ND	10	ND	11	ND	10
cis-1,3-dichloropropene	ND	11	ND	10	ND	10	ND	11	ND	10
Trichloroethene	ND	11	ND	10	ND	10	ND	11	ND	10
Dibromochloromethane	ND	11	ND	10	ND	10	ND	11	ND	10
1,1,2-Trichloroethane	ND	11	ND	10	ND	10	ND	11	ND	10
Benzene	ND	11	ND	10	ND	10	ND	11	ND	10
trans-1,3-dichloropropene	ND	11	ND	10	ND	10	ND	11	ND	10
Bromoform	ND	11	ND	10	ND	10	ND	11	ND	10
4-Methyl-2-Pentanone	ND	11	ND	10	ND	10	ND	11	ND	10
2-Hexanone	ND	11	ND	10	ND	10	ND	11	ND	10
Tetrachloroethene	ND	11	ND	10	ND	10	ND	11	ND	10
1,1,2,2-Tetrachloroethane	ND	11	ND	10	ND	10	ND	11	ND	10
Toluene	ND	11	ND	10	ND	10	ND	11	ND	10
Chlorobenzene	ND	11	ND	10	ND	10	ND	11	ND	10
Ethylbenzene	ND	11	ND	10	ND	10	ND	11	ND	10
Styrene	ND	11	ND	10	ND	10	ND	11	ND	10
Total Xylenes	ND	11	ND	10	ND	10	ND	11	ND	10

NDx = Not detected at or above x.

J = The value is an estimate.

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Table 2 Semivolatile Results
All Target Compounds
Hooker/RUCO Site
Sampled November 5, 1992

Page 1 of 2

Analytes	TB51 0-2' (SS13) ug/kg	TB51 3-5' (SS14) ug/kg	TB52 0-2' (SS15) ug/kg	TB52 0-2' (FIELD DUP) (SS16) ug/kg	TB52 3-5' (SS17) ug/kg
Phenol	ND 360	ND 340	ND 690	ND 350	ND 390
bis(2-Chloroethyl)Ether	ND 360	ND 340	ND 690	ND 350	ND 390
2-Chlorophenol	ND 360	ND 340	ND 690	ND 350	ND 390
1,3-Dichlorobenzene	ND 360	ND 340	ND 690	ND 350	ND 390
1,4-Dichlorobenzene	ND 360	ND 340	ND 690	ND 350	ND 390
Benzyl Alcohol	ND 360	ND 340	ND 690	ND 350	ND 390
1,2-Dichlorobenzene	ND 360	ND 340	ND 690	ND 350	ND 390
2-Methylphenol	ND 360	ND 340	ND 690	ND 350	ND 390
bis(2-Chloroisopropyl)Ether	ND 360	ND 340	ND 690	ND 350	ND 390
4-Methylphenol	ND 360	ND 340	ND 690	ND 350	ND 390
N-Nitroso-Di-n-Propylamine	ND 360	ND 340	ND 690	ND 350	ND 390
Hexachloroethane	ND 360	ND 340	ND 690	ND 350	ND 390
Nitrobenzene	ND 360	ND 340	ND 690	ND 350	ND 390
Isophorone	ND 360	ND 340	ND 690	ND 350	ND 390
2-Nitrophenol	ND 360	ND 340	ND 690	ND 350	ND 390
2,4-Dimethylphenol	ND 360	ND 340	ND 690	ND 350	ND 390
Benzoic Acid	ND 360	ND 340	ND 690	ND 350	ND 390
bis(2-Chloroethoxy)Methane	ND 360	ND 340	ND 690	ND 350	ND 390
2,4-Dichlorophenol	ND 360	ND 340	ND 690	ND 350	ND 390
1,2,4-Trichlorobenzene	ND 360	ND 340	ND 690	ND 350	ND 390
Naphthalene	ND 360	ND 340	ND 690	ND 350	41 J
4-Chloroaniline	ND 360	ND 340	ND 690	ND 350	ND 390
Hexachlorobutadiene	ND 360	ND 340	ND 690	ND 350	ND 390
4-Chloro-3-Methylphenol	ND 360	ND 340	ND 690	ND 350	ND 390
2-Methylnaphthalene	ND 360	ND 340	ND 690	ND 350	ND 390
Hexachlorocyclopentadiene	ND 360	ND 340	ND 690	ND 350	ND 390
2,4,6-Trichlorophenol	ND 360	ND 340	ND 690	ND 350	ND 390
2,4,5-Trichlorophenol	ND 900	ND 840	ND 1700	ND 890	ND 980
2-Chloronaphthalene	ND 360	ND 340	ND 690	ND 350	ND 390
2-Nitroaniline	ND 900	ND 840	ND 1700	ND 890	ND 980
Dimethyl Phthalate	ND 360	ND 340	ND 690	ND 350	ND 390
Acenaphthylene	ND 360	ND 340	ND 690	ND 350	19 J
2,6-Dinitrotoluene	ND 360	ND 340	ND 690	ND 350	ND 390
3-Nitroaniline	ND 900	ND 840	ND 1700	ND 890	ND 980
Acenaphthene	ND 360	ND 340	ND 690	ND 350	81 J

NDx = Not detected at or above x.

J = This value is an estimate.

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Table 2 Semivolatile Results
All Target Compounds
Hooker/RUCO Site
Sampled November 5, 1992

Page 2 of 2

Analytes	TB51 0-2'		TB51 3-5'		TB52 0-2'		TB52 0-2'		TB52 3-5'	
	(SS13)		(SS14)		(SS15)		(FIELD DUP)		(SS17)	
	ug/kg		ug/kg		ug/kg		ug/kg		ug/kg	
2,4-Dinitrophenol	ND	900	ND	840	ND	1700	ND	890	ND	980
4-Nitrophenol	ND	900	ND	840	ND	1700	ND	890	ND	980
Dibenzofuran	ND	360	ND	340	ND	690	ND	350		26 J
2,4-Dinitrotoluene	ND	360	ND	340	ND	690	ND	350	ND	390
Diethylphthalate	ND	360	ND	340	ND	690	ND	350	ND	390
4-Chlorophenyl-phenylether	ND	360	ND	340	ND	690	ND	350	ND	390
Fluorene	ND	360	ND	340	ND	690	ND	350		52 J
4-Nitroaniline	ND	900	ND	840	ND	1700	ND	890	ND	980
4,6-Dinitro-2-Methylphenol	ND	900	ND	840	ND	1700	ND	890	ND	980
N-Nitrosodiphenylamine (1)	ND	360	ND	340	ND	690	ND	350	ND	390
4-Bromophenyl-phenylether	ND	360	ND	340	ND	690	ND	350	ND	390
Hexachlorobenzene	ND	360	ND	340	ND	690	ND	350	ND	390
Pentachlorophenol	ND	900	ND	840	ND	1700	ND	890	ND	980
Phenanthrene		44 J	ND	340		80 J		64 J		290 J
Anthracene	ND	360	ND	340	ND	690	ND	350		73 J
Carbazole	ND	360	ND	340	ND	690	ND	350		55 J
Di-n-Butylphthalate	ND	360	ND	340	ND	690	ND	350	ND	390
Fluoranthene		74 J	ND	340		220 J		180 J		420
Pyrene		38 J	ND	340		150 J		190 J		200 J
Butylbenzylphthalate	ND	360	ND	340	ND	690	ND	350	ND	390
3,3'-Dichlorobenzidine	ND	360	ND	340	ND	690	ND	350	ND	390
Benzo(a)Anthracene		30 J	ND	340		110 J		94 J		150 J
Chrysene		32 J	ND	340		140 J		160 J		150 J
Bis(2-Ethylhexyl)Phthalate		69 J	ND	340		440 J		420 J		120 J
Di-n-Octyl Phthalate	ND	360	ND	340	ND	690	ND	350	ND	390
Benzo(b)Fluoranthene		33 J	ND	340		200 J		160 J		170 J
Benzo(k)Fluoranthene	ND	360	ND	340		83 J		110 J		64 J
Benzo(a)Pyrene		29 J	ND	340		140 J		130 J		110 J
Indeno(1,2,3-cd)Pyrene	ND	360	ND	340		91 J		76 J		63 J
Dibenz(a,h)Anthracene	ND	360	ND	340	ND	690		26 J	ND	390
Benzo(g,h,i)Perylene	ND	360	ND	340		93 J		70 J		54 J

(1) Cannot be separated from Diphenylamine

NDx = Not detected at or above x.

J = This value is an estimate.

Table 3 Pesticides Results
All Target Compounds
Hooker/RUCO Site
Sampled November 5, 1992

Compound	TB51 0-2' (SS13) ug/kg		TB51 3-5' (SS14) ug/kg		TB52 0-2' (SS15) ug/kg		TB52 0-2' (FIELD DUP) (SS16) ug/kg		TB52 3-5' (SS17) ug/kg	
alpha-BHC	ND	1.8	ND	1.7	ND	1.7	ND	1.8	ND	2
beta-BHC	ND	1.8	ND	1.7	ND	1.7	ND	1.8	ND	2
delta-BHC	ND	1.8	ND	1.7	ND	1.7	ND	1.8	ND	2
gamma-BHC (Lindane)	ND	1.8	ND	1.7	ND	1.7	ND	1.8	ND	2
Heptachlor	ND	1.8	ND	1.7	ND	1.7	ND	1.8	ND	2
Aldrin	ND	1.8	ND	1.7	ND	1.7	ND	1.8	ND	2
Heptachlor epoxide	ND	1.8	ND	1.7	ND	1.7	ND	1.8	ND	2
Endosulfan I	ND	1.8	ND	1.7	ND	1.7	0.89 J		ND	2
Dieldrin	ND	3.6	ND	3.4	ND	3.4	ND	3.5	ND	3.9
4,4'-DDE	ND	3.6		1.3 J		3.1 J		2.5 J	ND	3.9
Endrin	ND	3.6		1 J		5.8 J		5.3 J		0.81 J
Endosulfan II	ND	3.6	ND	3.4		1.4 J		1.1 J	ND	3.9
4,4'-DDD	ND	3.6	ND	3.4	ND	3.4	ND	3.5	ND	3.9
Endosulfan Sulfate	ND	3.6	ND	3.4	ND	3.4	ND	3.5	ND	3.9
4,4'-DDT	ND	3.6	ND	3.4	ND	3.4	ND	3.5	ND	3.9
Methoxychlor	ND	18	ND	17	ND	17	ND	18	ND	20
Endrin ketone	ND	3.6	ND	3.4	ND	3.4	ND	3.5	ND	3.9
Endrin aldehyde	ND	3.6	ND	3.4	ND	3.4	ND	3.5	ND	3.9
alpha-Chlordane	ND	1.8		1.7		4.9		4.3		0.67 J
gamma-Chlordane	ND	1.8	ND	1.7	ND	1.7	ND	1.8	ND	2
Toxaphene	ND	180	ND	170	ND	170	ND	180	ND	200
Aroclor-1016	ND	36	ND	34	ND	34	ND	35	ND	39
Aroclor-1221	ND	72	ND	67	ND	69	ND	71	ND	78
Aroclor-1232	ND	36	ND	34	ND	34	ND	35	ND	39
Aroclor-1242	ND	36	ND	34	ND	34	ND	35	ND	39
Aroclor-1248	ND	36		36 J		170		120 J		39 J
Aroclor-1254	ND	36		41 J		150		130		20 J
Aroclor-1260	ND	36	ND	34	ND	34	ND	35	ND	39

J = The value is an estimate.

NDx = Not detected at or above x.

Table 4 Metals Results
All Target Compounds
Hooker/RUCO Site

Analyte	TB51 0-2'		TB51 3-5'		TB52 0-2'		TB52 0-2' (FIELD DUP)		TB52 3-5'	
	(SS13)		(SS14)		(SS15)		(SS16)		(SS17)	
	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Aluminum		5900		2400		3000		2300		2100
Antimony	ND	6.7	ND	6.3	ND	6.5	ND	6.5	ND	6.5
Arsenic		3.3		3.1		1.6 B	ND	0.84	ND	0.83
Barium		14 B		7.4 B		15 B		11 B		8.4 B
Beryllium		0.62 B		0.4 B		0.43 B		0.28 B		0.31 B
Cadmium	ND	0.65	ND	0.61	ND	0.63	ND	0.63	ND	0.63
Calcium		2600		2800		7000		1800		4700
Chromium		8.2 J		27 J		6.1 J		4.3 J		4.9 J
Cobalt		6.2 B		2.7 B		3.2 B	ND	1.5		2 B
Copper		13		8.6		10		13		6.9
Iron		12000		8300		8000		4300		5300
Lead		8.1 J		4.4 J		26 J		17 J		4.8 J
Magnesium		2100		1500		4400		1300		2800
Manganese		170		74		140		83		80
Mercury	ND	0.11	ND	0.1		0.12 J		0.31 J	ND	0.1
Nickel		6.5 J		2.8 J		5.5 J		3.4 J		3.2 J
Potassium		260 B		160 B		190 B		190 B		170 B
Selenium	ND	0.43	ND	0.41	ND	0.42	ND	0.42	ND	0.42
Silver	ND	1.1	ND	1	ND	1.1	ND	1.1	ND	1
Sodium		200 J		170 J		130 J		93 B		110 J
Thallium	ND	0.86	ND	0.82	ND	0.84	ND	0.84	ND	0.83
Vanadium		19		13		15		8.5 B		10 B
Zinc		20 J	ND	13		37 J		23 J	ND	14
Cyanide	ND	0.54	ND	0.51	ND	0.53	ND	0.53	ND	0.52

NDx = Not detected at or above x.

J = The value is an estimate.

B = The value is below the method required reporting limit
but above the method detection limit.

TABLE 5

**OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK**

TBC Guidance Values for Soils

Element	Recommended Soil Cleanup Goal ^{1/} (mg/kg)	Background ^{2/3/4/} (mg/kg)	Proposed TBC Soil Cleanup Criteria (mg/kg)
Aluminum	30	246 - 25,000	25,000
Antimony	30	<3 - 18	30
Barium	300	2.3 - 600	600
Beryllium	0.14	0 - 7	7
Cadmium	1	0.01 - 2	2
Calcium	SB	<67.7 - 35,000	35,000
Chromium	10	1.6 - 40	40
Cobalt	30	<0.54 - 60	60
Copper	25	1.7 - 31	31
Iron	2,000	2,150 - 16,000	16,000
Magnesium	SB	<17.5 - 9,700	9,700
Manganese	SB	<3.4 - 5,000	5,000
Nickel	13	0.5 - 34	34
Potassium	4,000	54 - 43,000	43,000
Silver	200	<0.15 - 2.4	200
Sodium	3,000	<14.6 - 50,000	50,000
Vanadium	150	1 - 300	300
Zinc	20	<1.7 - 110	110
Arsenic	7.5	0.95 - 21	21
Mercury	0.1	<0.07 - 0.1	0.1
Lead	30	0.8 - 240	240
Selenium	2	0.1 - 3.9	3.9
Thallium	20	<0.32 - 0.35	20

1/ NYSDEC TAGM 4046 "Determination of Soil Cleanup Objectives and Cleanup Levels, " 1992.

2/ McGovern, E., "Background Concentrations of 20 Elements in Soil with Special Regard for New York State".

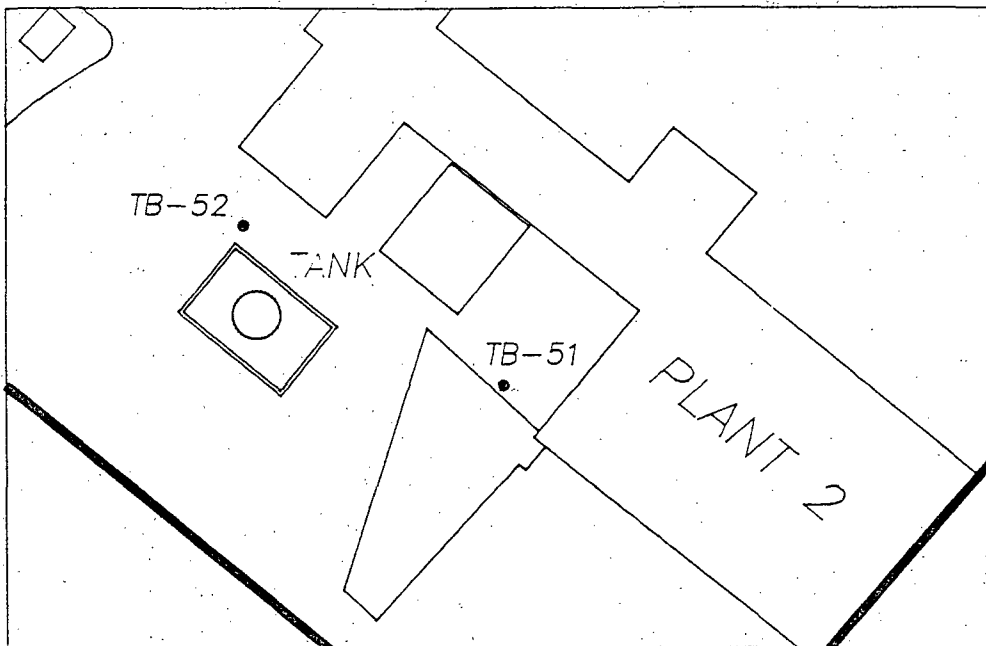
3/ Geraghty & Miller, Inc., "Data Report, Phase I Remedial Investigation, Grumman Aerospace Corporation, Bethpage, New York (1992)"; Inorganic Soil Concentrations from GMS-1S, GMS-1I, GMS-2I and GMS-3I.

4/ Inorganic soil concentrations from baseline borings Pilot Hole G, Pilot Hole S and Well Q-1 installed during the 1989 RI.
SB - Site background.

FIGURE

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LEGEND

- TEST BORING LOCATION



OCCIDENTAL CHEMICAL CORPORATION HOOKER/RUCO SITE HICKSVILLE, NEW YORK

TEST BORING LOCATION MAP

DATE	REVISED	PREPARED BY:
11/17/92	ADDITIONAL TB'S	LEGGETTE, BRASHEARS & GRAHAM, INC.
		Professional Ground-Water Consultants
		72 Danbury Road
		Wilton, CT 06897
		(203) 782-1207
		DATE: 7/29/92
		FIGURE: 1

APPENDIX I

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LEGGETTE, BRASHEARS & GRAHAM, INC.

GEOLOGIC LOG		OWNER: Occidental Chemical Corporation	
LEGGETTE, BRASHEARS & GRAHAM, INC.		WELL NO.: TB-51	
WILTON, CONNECTICUT		PAGE: 1 OF 1 PAGES	
SITE LOCATION: Hooker/Ruco Site Hicksville, New York		SCREEN SIZE & TYPE:	
		SLOT NO.: SETTING:	
DATE COMPLETED: November 5, 1992		SAND PACK SIZE & TYPE:	
DRILLING COMPANY: Aquifer Drilling & Testing		SETTING:	
		CASING SIZE & TYPE:	
DRILLING METHOD: Hollow-stem auger		SETTING:	
SAMPLING METHOD: 3-inch split spoon		SEAL TYPE:	
OBSERVER: W. Thomas West		SETTING:	
REFERENCE POINT (RP): Grade surface		BACKFILL TYPE:	
ELEVATION OF RP: NA		STATIC WATER LEVEL:	
STICK-UP: NA		DEVELOPMENT METHOD:	
SURFACE COMPLETION: NA		DURATION: YIELD:	
REMARKS: Test boring installed 10 feet south of Tanks 8 and 9.			
ABBREVIATIONS: SS = split spoon W = wash C = cuttings G = grab ST = shelly tube REC = Recovery PPM = parts per million			

DEPTH (FEET)		SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
FROM	TO					
0	2	SS	40-35-26-36	1.6	0.3	SAND, coarse to fine; some silt and cobbles; gray-tan.
3	5	SS	38-28-26-37	1.0	0.3	SAND, coarse to medium; some cobbles; tan.
5	7	SS	28-26-40-54	1.8	0.4	SAND, coarse to medium; some cobbles; tan.
10	12	SS	100-0-0-0	0.6	0.7	SAND, coarse to medium; some cobbles; tan.
15	17	SS	75-45-32-28	1.7	2.3	SAND, coarse to fine; some cobbles; tan.
20	22	SS	32-28-36-35	1.5	0.4	SAND, medium; some sand, coarse to fine; little cobbles; tan.
25	27	SS	28-26-29-32	1.5	0.4	SAND, medium; some sand; coarse to fine; little cobbles; tan.
30	32	SS	26-28-32-27	1.9	1.9	SAND, coarse to medium; some sand, fine; little cobbles; tan.
	32					End of boring.

HKR 002 0289

GEOLOGIC LOG		OWNER: Occidental Chemical Corporation	
LEGGETTE, BRASHEARS & GRAHAM, INC.		WELL NO.: TB-52	
WILTON, CONNECTICUT		PAGE: 1 OF 1 PAGES	
SITE LOCATION: Hooker/Ruco Site Hicksville, New York		SCREEN SIZE & TYPE:	
		SLOT NO.: SETTING:	
DATE COMPLETED: November 5, 1992		SAND PACK SIZE & TYPE:	
DRILLING COMPANY: Aquifer Drilling & Testing		SETTING:	
		CASING SIZE & TYPE:	
DRILLING METHOD: Hollow-stem auger		SETTING:	
SAMPLING METHOD: 3-inch split spoon		SEAL TYPE:	
OBSERVER: W. Thomas West		SETTING:	
REFERENCE POINT (RP): Grade		BACKFILL TYPE:	
ELEVATION OF RP:		STATIC WATER LEVEL:	
STICK-UP:		DEVELOPMENT METHOD:	
SURFACE COMPLETION:		DURATION: YIELD:	
REMARKS: Test boring installed 10 feet northwest of Tank 10.			
ABBREVIATIONS: SS = split spoon W = wash C = cuttings G = grab ST = shelly tube REC = Recovery PPM = parts per million			

DEPTH (FEET)		SAMPLE TYPE	BLOW COUNT	REC. (FEET)	PID READING (PPM)	DESCRIPTION
FROM	TO					
0	2	SS	10-12-15-12	0.7	0.0	SAND, coarse to fine; and cobbles; brown.
3	5	SS	85-28-38-26	1.1	0.3	SAND, coarse to medium; some sand, fine and cobbles; tan.
5	7	SS	100-0-0-0	0.0	NA	No geologic log.
10	12	SS	60-45-38-26	1.3	0.3	SAND, coarse to fine; some silt and cobbles; tan.
15	17	SS	65-45-28-35	1.6	0.3	SAND, coarse to fine; some cobbles; tan.
20	22	SS	52-48-36-22	1.7	0.7	SAND, coarse to medium; some sand, fine; and cobbles; tan.
25	27	SS	67-47-46-28	1.3	1.1	SAND, coarse to fine; some cobbles; tan.
30	32	SS	32-26-31-36	1.7	0.7	SAND, coarse to fine; some cobbles; tan.
	32					End of boring.

HKR 002 0290

APPENDIX II

HKR 002 0291

LEGGETTE, BRASHEARS & GRAHAM, INC.

CLIENT CODE _____

QUOTE / SAR NUMBER _____

Chain-of Custody Record

Division of Enseco Incorporated
4101 SHUFFEL DRIVE N.W./NORTH CANTON, OHIO 44720
(216) 497-9396 FAX (216) 497-0772

№ 30764

[illegible]

HKR 002 0292

**Data Validation
for
Occidental Chemical Corporation
Hooker/RUCO Site (Hicksville)**

Submitted to:

**Patrick Garrity
Occidental Chemical Corporation
360 Rainbow Blvd.
Niagara, NY**

**Prepared
by
Ronald K. Mitchum, Ph.D.
Triangle Laboratories of Columbus, Inc.
6385 Shier Rings Rd. #2
Dublin, OH 43017**

May 5, 1993

**Quality Assurance Review
Occidental Chemical Corporation
Hooker/RUCO Site (Hicksville)**

Executive Summary

Volatiles

The data were reviewed for usability based upon quality control parameters. The volatile compounds observed for the soils were all non-detected. Field blank 002 contained acetone at 2100 $\mu\text{g/L}$. There were no other compounds identified in the volatile fraction. The quality control parameters were reviewed and had little impact upon the data due to the non-detects. These data have been reviewed and judged acceptable.

Semivolatiles

The semivolatiles fraction was reviewed for usability based upon the quality control parameters. Polycyclic aromatic hydrocarbons (PAH) were the predominant semivolatile compound class. The highest level of any of the PAHs was fluoranthene in soil sample TB52 (3-5') at 420 $\mu\text{g/kg}$. Bis(2-Ethylhexyl)phthalate, a common contaminant, was found in all soil samples ranging in concentration from 69-440 $\mu\text{g/kg}$. Review of the quality control data did not result in the rejection of data. These data have been reviewed and judged acceptable as qualified.

Pesticides

The data were reviewed for usability based upon the quality control parameters and the identification criteria. Sediment sample TB51 (0-2') contained no pesticides or PCBs. The remaining soil samples contained endrin, alpha-chlordane, aroclor-1248 and aroclor-1254 ranging from 0.67-170 $\mu\text{g/kg}$. Endosulfan I was found in soil sample TB52 (0-2')(field dup) at 0.89 $\mu\text{g/kg}$ and endosulfan II was found in soil sample TB51 (3-5') at 1.4 $\mu\text{g/kg}$ and soil sample TB52 (0-2')(field dup) at 1.1 $\mu\text{g/kg}$. 4,4'-DDE was found in soil samples TB51 (3-5') (1.3 $\mu\text{g/kg}$), TB52 (0-2') (3.1 $\mu\text{g/kg}$) and TB52 (0-2')(field dup) (2.5 $\mu\text{g/kg}$). The quality control review resulted in some values being qualified as estimates. These data have been reviewed and judged acceptable.

Metals

The metals fraction was reviewed for usability based upon the quality control parameters. Antimony, cadmium, mercury, selenium, silver, thallium and cyanide were not detected in any of the soil samples. Aluminum (50-150 times CRDL), iron (200-600 times CRDL) and manganese (25-50 times CRDL) results were high. Calcium, copper, magnesium, vanadium and zinc results were 1-10 times higher than the CRDL. The toxic metals chromium (2-15

times CRDL) and lead (7-43 times CRDL) were above the CRDL with lead being highest. Arsenic (142 CRDL) was found in samples TB51(0-2') and TB51 (3-5') and mercury (1-4 times CRDL) was found in samples TB52 (0-2') and TB52 (0-2') (field dup). There were % spike recoveries, duplicates and ICP %Ds outside the control limits and blank contamination affecting this data. These data have been reviewed and judged acceptable as qualified.

QA/QC Review Summary
Full Data Validation
Hooker/RUCO (Hicksville)

Sample ID:

<u>Lab ID</u>	Pesticides Volatiles and Semivolatiles	Metals	<u>Matrix</u>
	<u>Field ID</u>	<u>Lab ID</u>	
SS11	Field Blank 001	6776-66442	Water
SS12	Field Blank 002	6776-66443	Water
SS13	TB51 0-2'	6777-66448	Soil
SS14	TB51 3-5'	6777-66449	Soil
SS15	TB52 0-2'	6777-66450	Soil
SS16	TB52 0-2' (Field Dup)	6777-66451	Soil
SS17	TB52 3-5'	6777-66452	Soil

QC Criteria Reviewed:

These QC criteria are included in this full data validation: Holding times; initial and continuing calibration; blanks; surrogate recoveries; laboratory control sample; matrix spike/matrix spike duplicate; ICP serial dilution; internal standard performance; and other method specific QC parameters as required.

A. Introduction

This data validation has been performed according to these respective guidelines:

CLP Organics *U.S. EPA National Functional Guidelines for Organic Data Review, (Revised June 1991);*

CLP Inorganics *Evaluating Inorganics Analyses (June 13, 1988);*

Pesticides/PCBs *Pesticide/Aroclor Data Review (Draft 06/91);*

The data was qualified to indicate to the user the confidence in the analytical result or detection limit. These qualifiers are subjective and encompass the evaluation of a broad range of analytical QC parameters. The qualification of data does not necessarily indicate poor laboratory performance in the application of the method but may indicate method inadequacies caused by the complex matrix.

This report is for the fractions and methods listed below:

<u>Fraction</u>	<u>Method</u>
Volatile Organics	3/90 SOW CLP
Semivolatile Organics	3/90 SOW CLP
Pesticides/PCBs	3/90 SOW CLP
Metals	3/90 SOW CLP
Cyanide	3/90 SOW CLP

The volatiles, semivolatiles, and pesticides/PCBs fractions were qualified on the basis of holding time, calibration, blanks, surrogate recovery, matrix spike/matrix spike duplicate, internal standard performance, and other QC data as necessary. Data usability is based upon a combination of factors which includes the reviewer's professional judgment.

The metals/cyanide fraction was qualified on the basis of holding times, calibration, blanks, laboratory control sample, matrix spike/matrix spike duplicate, ICP serial dilution, and other QC parameters as necessary to obtain an overall assessment of data quality.

B. Data Assessment

This assessment summarizes the attached detailed worksheets.

I. Holding Times

Volatiles

The holding times of 14 days from the date of collection to the date of analysis were met.

Semivolatiles

The holding times of 7 days from the date of collection to the date of extraction and 40 days from the date of extraction to the date of analysis have been met.

Pesticides/PCBs

The holding times of 14 days from the date of collection to the date of extraction and 40 days from the date of extraction to the date of analysis were met.

Metals/Cyanide

The holding times for metals (6 months) mercury (28 days) and cyanides (14 days) from the date of collection to the date of distillation/digestion were met.

II. Instrument Performance

A. GC/MS (Tuning)

Volatiles

All GC/MS instrument performance checks met ion abundance criteria.

Semivolatiles

All GC/MS instrument performance checks met ion abundance criteria.

B. GC/ECD

Pesticides

The breakdown criteria [endrin (20%), 4,4'-DDT (20%) and combined (30%)] were all met. PEMs were not reported every 12 hours, but were all done within 12 hours of the relevant samples.

III. Calibration (Initial and Continuing)

Satisfactory instrument calibration is established to ensure the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks and documents the instrument's daily performance.

a) Response Factor

The response factor (RF) measures the relative ratio of instrument responses of analyte and internal standard. An RF of ≤ 0.05 indicates a serious detection problem for the analyte. This will result in poor sensitivity. Analytes detected in a sample would be qualified as estimated, "J". All non-detects for that analyte would be qualified "R".

- b) Percent relative standard deviation (%RSD) and percent differences (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be $< 30\%$ and %D must be $< 25\%$. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J". Non-detects are flagged "UJ" if %D or RSD exceeds 50%. If there is a gross deviation of %RSD and %D, the non-detects may be rejected ("R").

Volatiles

Due to initial calibration (10/22/92) problems, the result for the following sample was qualified as estimated (J):

- Acetone for Field Blank 002.

Percent RPD was outside the control limit of 30% for acetone (70.8%) and 2-butanone (36.87%). The non-detects were not qualified because %RPD would have little effect on the CRQL, and there were no positive hits for 2-butanone.

Due to initial calibration (11/2/92) problems, the results for the following samples were qualified as estimated (J):

- Acetone for samples TB52 (0-2')(field dup) and TB52 (3-5').

Percent RPD was outside the control limit of 30% for acetone (34.6%)

Due to continuing calibration (11/9/92) problems, non-detected results for the following samples were qualified as estimated (UJ):

- Acetone for Field Blank 001.

- 2-Butanone, 4-methyl-2-pentanone and 2-hexanone for Field Blanks 001 and 002

The result for the following sample was qualified as estimated (J):

- Acetone for Field Blank 002.

Percent differences were outside the control limits of $\pm 25\%$ for acetone (41.4%), 2-butanone (51.9%), 4-methyl-2-pentanone (33.2%) and 2-hexanone (46.0%).

Due to continuing calibration (11/10/92) problems, non-detected results for the following samples were qualified as estimated (UJ):

- Chloromethane, 2-butanone, 4-methyl-2-pentanone and 2-hexanone for samples TB51 (0-2'), TB51 3-5', TB52 (0-2'), TB52 (0-2')(field dup) and TB52 (3-5').
- Acetone for samples TB51 (0-2'), TB51 (3-5') and TB52 (0-2').

Results for the following were qualified as estimated (J):

- Acetone for samples TB52 (0-2')(field dup) and TB52 (3-5').

Percent differences were outside the control limits of $\pm 25\%$ for chloromethane (26.6%), acetone (41.2%), 2-butanone (32.7%), 4-methyl-2-pentanone (26.3%) and 2-hexanone (28.5%).

The qualified data for positive %Ds may show a positive bias, which could be due to lab contamination or chromatographic performance. The detection limits are estimates.

Semivolatiles

All initial calibration %RPDs were within the control limits of 30%.

Due to continuing calibration (11/16/92) problems, non-detected results for the following samples were qualified as estimated (UJ):

- Hexachlorocyclopentadiene, 4-nitroaniline, butylbenzylphthalate, 3,3'-dichlorobenzidine and di-n-octylphthalate for samples Field Blank 001, Field Blank 002, TB51 (0-2'), TB51 (3-5'), TB52 (0-2') and TB52 (3-5').

- Bis(2-ethylhexyl)phthalate for Field Blank 001.

Results for the following samples were qualified as estimated (J):

- Bis(2-ethylhexyl)phthalate for samples Field Blank 002, TB51 (0-2'), TB51 (3-5'), TB52 (0-2') and TB52 (3-5').

Percent differences were outside the control limits of $\pm 25\%$ for hexachlorocyclopentadiene (31.0%), 4-nitroaniline (39.3%), butylbenzylphthalate (37.0%), 3,3'-dichlorobenzidine (47.3%), bis(2-ethylhexyl)phthalate (38.3%) and di-n-octylphthalate (42.6%).

Due to continuing calibration (11/19/92) problems, non-detected results for the following sample were qualified as estimated (UJ):

- 4-Nitrophenol, 4-nitroaniline and 3,3'-dichlorobenzidine for sample TB52 (0-2')(field dup).

Results for the following sample were qualified as estimated (J):

- Di-n-butylphthalate and bis(2-ethylhexyl)phthalate for sample TB52 (0-2')(field dup).

Percent differences were outside the control limits of $\pm 25\%$ for 4-nitrophenol (43.5%), 4-nitroaniline (50.7%), di-n-butylphthalate (29.6%), 3,3'-dichlorobenzidine (29.8%) and bis (2-ethylhexyl)phthalate (32.8%).

The qualified data for positive %Ds may show a positive bias and could be caused by lab contamination or chromatographic performance.

Pesticides/PCBs

In the initial calibration alpha-BHC and delta-BHC in RTX-5 column had %RSDs [alpha-BHC (22.2%) and delta-BHC (28.3%)] outside the control limit of 20%. No requalification was necessary because neither compound was found on either column in any samples.

Continuing calibration RPDs for INDA and INDB (midpoint) are within the 25% limit.

Metals/Cyanide

All initial and continuing calibration percent recoveries were within the quality control limits.

IV. Blanks

Quality Assurance (QA) blanks, including method, trip, field, initial, continuing, and preparation blanks, are prepared to identify contamination present in analytical or field collection and transportation activities. For example, laboratory cross-contamination is measured with method blanks; trip blanks measure cross-contamination during shipment; and field blanks measure contamination during field operations, such as, during sampling and shipment.

Analytes are qualified with respect to blank contamination, its severity and frequency. If the concentration of the analyte in a sample is less than 5 times the blank contaminate level (10 times for common laboratory contaminants), the analytes are qualified as "U", non-detected.

Volatiles (Laboratory and Field Blanks)

Due to field blank (002) contamination (acetone-2100) results for the following samples were changed and qualified non-detected (U):

<u>Compound</u>	<u>Before</u>	<u>Qualified</u>	<u>Sample</u>
Acetone	6 J	11 U	TB52 (0-2') (field dup)
Acetone	7 J	10 U	TB52 (3-5')

Acetone is a common lab contaminant.

Semivolatiles (Laboratory and Field Blanks)

Due to method blank (SBLK1) contamination by di-n-butylphthalate (0.7 J), results for the following samples were changed and were qualified as non-detected (U):

<u>Compounds</u>	<u>Before</u>	<u>Qualified</u>	<u>Field Blank</u>
Di-n-butylphthalate	0.5 JB	10 U	001
Di-n-butylphthalate	0.5 JB	10 U	002

Due to method blank (SBLK2) contamination by di-n-butylphthalate (24J), results for the following samples were changed and were qualified as non-detected (U):

<u>Compound</u>	<u>Before</u>	<u>Qualified</u>	<u>Sample</u>
Di-n-butylphthalate	45 JB	360 U	TB51 (0-2')
Di-n-butylphthalate	55 JB	340 U	TB51 (3-5')
Di-n-butylphthalate	99 JB	350 U	TB52 (0-2') (field dup)
Di-n-butylphthalate	120 JB	390 U	TB52 (3-5')

Due to field blank (002) contamination by bis(2-ethylhexyl)phthalate (6J), the result for the following sample was changed and qualified as non-detected (U):

<u>Compound</u>	<u>Before</u>	<u>Qualified</u>	<u>Sample</u>
bis(2-ethylhexyl)phthalate	43 J	340 U	TB51 (3-5')

Due to method blank (SBLK1) TIC contamination for ethanol, 2-(2-ethoxyethoxy) (3JN), results for the following sample TICS were qualified unusable (R):

- Ethanol, 2-(2-ethoxyethoxy) for Field Blank 001 (TIC 2-RT 6.40) and Field Blank 002 (TIC 2-RT 6.40).

Due to method blank (SBLK2) TIC contamination for ethanol, 2-(2-ethoxyethoxy) (360 JN) results for the following sample TICS were qualified as unusable (R):

- Ethanol, 2-(2-ethoxyethoxy) for samples TB51 (0-2') (TIC 2-RT 6.43), TB51 (3-5') (TIC 2-RT 6.43), TB52 (0-2') (TIC 1-RT 6.42), TB52 (0-2') (field dup) (TIC 1-RT 6.17) and TB52 (3-5') (TIC 1-RT 6.45).

Di-n-butylphthalate and bis(2-ethylhexyl)phthalate are common lab contaminants. Ethanol, 2-(2-ethoxyethoxy) is not a common lab contaminant, but could be caused by cross contamination in the lab.

Pesticides/PCBs (Laboratory and Field Blanks)

Due to PBLKI contamination (beta-BHC - 0.17 JP) the following result was changed and qualified as non-detected (U):

<u>Compound</u>	<u>Before</u>	<u>Qualified</u>	<u>Sample</u>
beta-BHC	.016 PBJ	.05 U	Field Blank 002

Metals/Cyanide (Initial, Continuing, and Preparation; Field Blanks)

Due to preparation blank contamination by zinc (2.9 mg/kg), lead (1 µg/L), sodium (62.4 µg/L) and zinc (10.7 µg/L) results for the following samples were qualified as non-detected (U):

<u>Analyte(s)</u>	<u>Sample(s)</u>
Zinc	Field Blank 001, Field Blank 002, TB51 (3-5') and TB52 (3-5')
Sodium	Field Blank 001 and Field Blank 002
Lead	Field Blank 002

The values for the soil preparation blank in mg/kg for ICP analytes were all calculated wrong. All values were recalculated before qualification of samples.

Lead, sodium and zinc are common laboratory contaminants.

V. Surrogate Recovery

All samples are spiked with surrogate compounds to assess method performance in the laboratory. Matrix interferences may affect surrogate data, as well as, the efficiency of the analytical technique and operating parameters.

Volatiles

All surrogate % recoveries for the samples were within the control limits.

Semivolatiles

There were no surrogate % recoveries outside the control limits.

Pesticides/PCBs

Due to surrogate recovery problems, non-detected results for the following sample were qualified as estimated (UJ):

- All compounds for sample TB51 (0-2').

Percent recoveries were outside the limits of 60-150% for TCX1 (48%), TCX2 (41%), DCB1 (41%) and DCB2 (41%) for sample TB51 (0-2').

VI. ICP Interference Check Sample (ICS)

Metals/Cyanides

All ICP interference check sample percent recoveries were within the $\pm 20\%$ limits.

VII. Laboratory Control Sample (LCS)

Metals/Cyanide

All liquid and solid LCS percent recoveries fell within the control limits.

VIII. Matrix Spike/Matrix Spike Duplicate

The Matrix Spike/Matrix Spike Duplicate are used to assess the long term precision and accuracy of the analytical method. The MS/MSD data are not used to solely qualify data but are used in conjunction with other QC data to qualify data.

Volatiles

There were no MS/MSD % recoveries or %RPDs outside the control limits.

Semivolatiles

All MS/MSD percent recoveries and MSD %RPDs are within the control limits.

Pesticides/PCBs

All MS/MSD percent recoveries were within the control limits. One MS/MSD %RPD was outside the control limit of 31% (heptachlor-33%). There was no qualification done on the basis of this data alone.

Metals/Cyanide

Due to duplicate problems, the results for the following samples were qualified as estimated (J):

- Chromium and nickel for samples TB51 (0-2'), TB51 (3-5'), TB52 (0-2'), TB52 (0-2')(field dup) and TB52 (3-5').

- Zinc for samples TB51 (0-2'), TB52 (0-2'), and TB52 (0-2')(field dup).

The non-detected results for the following samples were qualified as estimated (UJ):

- Zinc for samples TB51 (3-5') and TB52 (3-5').

The duplicates were outside the control limits of ± 2 X CRDL (chromium and zinc) and $\pm 35\%$ (nickel) for soils.

Since samples Field Blank 001 and Field Blank 002 are field blanks, no duplicate was analyzed for them.

Due to spike recovery problems, results for the following undetected analytes were qualified as estimated (UJ):

- Antimony for samples TB51 (0-2'), TB51 (3-5'), TB52 (0-2'), TB52 (0-2')(field dup) and TB52 (3-5').

Results for the following analytes were qualified as estimated (J):

- Chromium and lead for samples TB51 (0-2'), TB51 (3-5'), TB52 (0-2'), TB52 (0-2')(field dup) and TB52 (3-5').
- Mercury for samples TB52 (0-2') and TB52 (0-2')(field dup).

The recoveries for antimony (67.7%), chromium (33.3%), lead (55.0%) and mercury (151.2%) were outside the control limits of 75-125%.

Since samples Field Blank 001 and Field Blank 002 are field blanks, there is no spike for them.

Post digestion spikes were done as required.

The low spike recoveries could be due to matrix interferences and should be used as estimates for limited purposes.

IX. Graphite Furnace Atomic Absorption (GFAA) QC

Metals

Due to post digestion spike recovery problems non-detected results for the following samples were qualified as estimated (UJ):

- Arsenic for samples Field Blank 001, Field Blank 002 and TB52 (0-2')(field dup).
- Thallium for samples Field Blank 001, Field Blank 002 and TB51 (0-2').
- Selenium for sample TB52 (0-2').

The post-digestion spike recoveries were outside the limits of 85-115% and the sample absorbance was less than 50% of the spike absorbance.

There were duplicate injections and the %RSDs for sample concentrations > CRDL agreed within $\pm 20\%$.

The post digestion spike recovery problems could be due to spectral interferences or matrix interferences. The results should be used as estimates for limited purposes.

X. ICP Serial Dilution

Metals/Cyanide

The ICP serial dilution determines whether significant physical or chemical interferences exist due to the sample matrix. If the analyte concentration is high (concentration in the original sample is minimally a factor of 50 above the IDL), an analysis of a five-fold dilution must agree within 10% difference of the original results.

Due to ICP serial dilution problems, the results for the following samples were qualified as estimated (J):

- Sodium for samples TB51 (0-2'), TB51 (3-5'), TB52 (0-2') and TB52 (3-5').

Percent difference was outside the control limit of 10% for sodium (14.2%).

XI. Internal Standard Performance

Internal standard (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than a factor of 2 (-50% to +100%) from the associated continuing calibration standard. The retention time of the

internal standard must not vary more than ± 30 seconds from the associated continuing calibration standard. If the area count is outside the (-50% to +100%) range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated, "J", and all non-detects as "UJ", or "R", if there is a severe loss of sensitivity.

If an internal standard retention time varies by more than 30 seconds, professional judgment is used to determine either partial or total rejection of the data for that sample fraction.

Volatiles

All internal standard areas and RTs are within the control limits.

Semivolatiles

All internal standard areas and RTs are within the limits.

XII. Sample Result Verification

Metals/Cyanide

The reported quantitation results are accurate.

XIII. Pesticide Cleanup Checks

Pesticides/PCBs

Percent recoveries for the florisil cartridge check standards met the QC limits of 80-120%. Percent recoveries for the GPC calibration standards met the QC limits of 80-110%.

XIV. Target Compound List (TCL) Compound Identification

Volatiles

The chromatography showed stability and the library searches matched the mass spectra of the compounds. Also, the RRTs of the reported compounds are within ± 0.06 RRT units of the standard RRT.

Semivolatiles

The chromatography showed stability and the library searches matched the

mass spectra of the compounds. Also, the RRTs of the reported compounds are within ± 0.06 RRT units of the standard RRT.

Pesticides/PCB's

Form X is complete for every sample in which a pesticide or PCB was detected. The retention times of the sample compounds are all within the calculated retention time windows for both quantitation and confirmation analyses.

Due to percent difference problems between the concentrations on column 1 and column 2, results for the following samples were qualified as estimated (J):

- 4,4'-DDE, aroclor-1248 and endrin for sample TB51 (3-5').
- 4,4'-DDE, endrin and endosulfan II for sample TB52 (0-2').
- Endosulfan I, 4,4'-DDE, endrin, endosulfan II and aroclor-1248 for sample TB52 (0-2') (field dup).
- Endrin, aroclor-1248 and aroclor-1254 for sample TB52 (3-5').

XV. Compound Quantitation and Reported Detection Limits

Volatiles

The reported quantitation results and Contract Required Quantitation Limits (CRQL) are accurate.

Semivolatiles

The reported quantitation results and Contract Required Quantitation Limits (CRQL) are accurate.

Pesticides

The reported quantitation results and Contract Required Quantitation Limits (CRQLs) were accurate.

XVI. Tentatively Identified Compounds (TIC)

Volatiles

There were no TICs in this data pack.

XVII. Semivolatiles

Due to TICs being "tentatively identified," results for the following samples were qualified (JN):

- TIC 5 (RT 16.85) for sample TB51 (0-2').
- TIC 3 (RT 19.82) and TIC 4 (RT 21.30) for sample TB51 (3-5').
- TIC 2 (RT 17.73) and TIC 3 (RT 19.82) for sample TB52 (0-2').
- TIC 3 (RT 16.50), TIC 8 (RT 24.48) and TIC 16 (RT 26.25) for sample TB52 (0-2') (field dup).

XVIII. System Performance

Volatiles

Based upon RIC background levels, internal standards' absolute retention times, baseline stability, peak identities, peak resolution and peak shape, the system performance was judged acceptable.

Semivolatiles

The chromatograms for samples TB52 (0-2'), TB52 (0-2') (field dup) and TB52 (3-5') exhibit complex profiles based upon RIC background level, internal standards' absolute retention times, baseline stability, peak identities, peak resolution and peak shape, the system performance was judged acceptable.

XIX. Other

Pesticides/PCBs

The valley to valley baseline assignment may have given low values for some analytes (eg. aroclor 1254 RE = 26.05 min. on page 569). Another example is 4,4'-DDE on RT 1701 column, TB52 (0-2'), RT = 24.38 min, page 546. A valley to baseline drop assignment may nearly double the measured amount, more closely matching the 2° column value.

Field blank duplicates (001 and 002) were submitted for analysis. In the pesticide analytical sequence, the retention times of TCX and DCB were within the QC limits of ± 0.05 and ± 0.1 respectively.

XX. Overall Assessment

Volatiles

The volatiles were qualified due to blank contamination and initial calibration %RPDs and continuing calibration %D's outside the limits. The data is usable as qualified.

Semivolatiles

Semivolatiles were qualified due to blank contamination and continuing calibration % recoveries outside the limits. The data qualified "R" is unusable. All other data is usable as qualified.

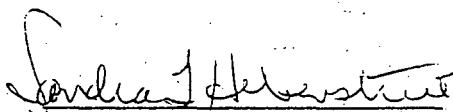
Pesticides/PCBs


Pesticides data was qualified due to blank contamination and surrogate recoveries outside the limits. All data is usable as qualified.

Metals/Cyanide


Metals were qualified due to blank contamination, duplicates outside the limits, spike recoveries outside the limits and ICP serial dilution % recoveries outside the limits. The data is usable as qualified.

Report prepared by:


Sandra F. Hebenstreit
Chemist


Randall L. Detra, Ph.D.
Senior Chemist

Report release by:


Ronald K. Mitchum, Ph.D.
President

TABLES

Table 1a Volatile Results
All Target Compounds
Hooker/RUCO Site
Sampled November 5, 1992

Compound	TB51 0-2' (SS13) ug/kg		TB51 3-5' (SS14) ug/kg		TB52 0-2' (SS15) ug/kg		TB52 0-2' (FIELD DUP) (SS16) ug/kg		TB52 3-5' (SS17) ug/kg	
Chloromethane	ND	11	ND	10	ND	10	ND	11	ND	10
Bromomethane	ND	11	ND	10	ND	10	ND	11	ND	10
Vinyl Chloride	ND	11	ND	10	ND	10	ND	11	ND	10
Chloroethane	ND	11	ND	10	ND	10	ND	11	ND	10
Methylene Chloride	ND	11	ND	10	ND	10	ND	11	ND	10
Acetone	ND	11	ND	10	ND	10	ND	11	ND	10
Carbon Disulfide	ND	11	ND	10	ND	10	ND	11	ND	10
1,1-Dichloroethene	ND	11	ND	10	ND	10	ND	11	ND	10
1,1-Dichloroethane	ND	11	ND	10	ND	10	ND	11	ND	10
1,2-Dichloroethene (total)	ND	11	ND	10	ND	10	ND	11	ND	10
Chloroform	ND	11	ND	10	ND	10	ND	11	ND	10
1,2-Dichloroethane	ND	11	ND	10	ND	10	ND	11	ND	10
2-Butanone	ND	11	ND	10	ND	10	ND	11	ND	10
1,1,1-Trichloroethane	ND	11	ND	10	ND	10	ND	11	ND	10
Carbon Tetrachloride	ND	11	ND	10	ND	10	ND	11	ND	10
Vinyl Acetate	ND	11	ND	10	ND	10	ND	11	ND	10
Bromodichloromethane	ND	11	ND	10	ND	10	ND	11	ND	10
1,2-Dichloropropane	ND	11	ND	10	ND	10	ND	11	ND	10
cis-1,3-dichloropropene	ND	11	ND	10	ND	10	ND	11	ND	10
Trichloroethene	ND	11	ND	10	ND	10	ND	11	ND	10
Dibromochloromethane	ND	11	ND	10	ND	10	ND	11	ND	10
1,1,2-Trichloroethane	ND	11	ND	10	ND	10	ND	11	ND	10
Benzene	ND	11	ND	10	ND	10	ND	11	ND	10
trans-1,3-dichloropropene	ND	11	ND	10	ND	10	ND	11	ND	10
Bromoform	ND	11	ND	10	ND	10	ND	11	ND	10
4-Methyl-2-Pentanone	ND	11	ND	10	ND	10	ND	11	ND	10
2-Hexanone	ND	11	ND	10	ND	10	ND	11	ND	10
Tetrachloroethene	ND	11	ND	10	ND	10	ND	11	ND	10
1,1,2,2-Tetrachloroethane	ND	11	ND	10	ND	10	ND	11	ND	10
Toluene	ND	11	ND	10	ND	10	ND	11	ND	10
Chlorobenzene	ND	11	ND	10	ND	10	ND	11	ND	10
Ethylbenzene	ND	11	ND	10	ND	10	ND	11	ND	10
Styrene	ND	11	ND	10	ND	10	ND	11	ND	10
Total Xylenes	ND	11	ND	10	ND	10	ND	11	ND	10

NDx = Not detected at or above x.

J = The value is an estimate.

Table 2a Semivolatile Results
All Target Compounds Summary
Hooker/RUCO Site
Sampled November 5, 1992

Analytes	TB51 0-2'	TB52 0-2'	TB52 0-2'	TB52 3-5'
	(SS13) ug/kg	(SS15) ug/kg	(FIELD DUP) (SS16) ug/kg	(SS17) ug/kg
Naphthalene				41 J
Acenaphthylene				19 J
Acenaphthene				81 J
Dibenzofuran				26 J
Fluorene				52 J
Phenanthrene	44 J	80 J	64 J	290 J
Anthracene				73 J
Carbazole				55 J
Fluoranthene	74 J	220 J	180 J	420
Pyrene	38 J	150 J	190 J	200 J
Benzo(a)Anthracene	30 J	110 J	94 J	150 J
Chrysene	32 J	140 J	160 J	150 J
Bis(2-Ethylhexyl)Phthalate	69 J	440 J	420 J	120 J
Benzo(b)Fluoranthene	33 J	200 J	160 J	170 J
Benzo(k)Fluoranthene		83 J	110 J	64 J
Benzo(a)Pyrene	29 J	140 J	130 J	110 J
Indeno(1,2,3-cd)Pyrene		91 J	76 J	63 J
Dibenz(a,h)Anthracene			26 J	
Benzo(g,h,i)Perylene		93 J	70 J	54 J

J = This value is an estimate.

Table 2b Semivolatile Results
All Target Compounds
Hooker/RUCO Site
Sampled November 5, 1992

Page 1 of 2

Analytes	TB51 0-2' (SS13) ug/kg	TB51 3-5' (SS14) ug/kg	TB52 0-2' (SS15) ug/kg	TB52 0-2' (FIELD DUP) (SS16) ug/kg	TB52 3-5' (SS17) ug/kg
Phenol	ND 360	ND 340	ND 690	ND 350	ND 390
bis(2-Chloroethyl)Ether	ND 360	ND 340	ND 690	ND 350	ND 390
2-Chlorophenol	ND 360	ND 340	ND 690	ND 350	ND 390
1,3-Dichlorobenzene	ND 360	ND 340	ND 690	ND 350	ND 390
1,4-Dichlorobenzene	ND 360	ND 340	ND 690	ND 350	ND 390
Benzyl Alcohol	ND 360	ND 340	ND 690	ND 350	ND 390
1,2-Dichlorobenzene	ND 360	ND 340	ND 690	ND 350	ND 390
2-Methylphenol	ND 360	ND 340	ND 690	ND 350	ND 390
bis(2-Chloroisopropyl)Ether	ND 360	ND 340	ND 690	ND 350	ND 390
4-Methylphenol	ND 360	ND 340	ND 690	ND 350	ND 390
N-Nitroso-Di-n-Propylamine	ND 360	ND 340	ND 690	ND 350	ND 390
Hexachloroethane	ND 360	ND 340	ND 690	ND 350	ND 390
Nitrobenzene	ND 360	ND 340	ND 690	ND 350	ND 390
Isophorone	ND 360	ND 340	ND 690	ND 350	ND 390
2-Nitrophenol	ND 360	ND 340	ND 690	ND 350	ND 390
2,4-Dimethylphenol	ND 360	ND 340	ND 690	ND 350	ND 390
Benzoic Acid	ND 360	ND 340	ND 690	ND 350	ND 390
bis(2-Chloroethoxy)Methane	ND 360	ND 340	ND 690	ND 350	ND 390
2,4-Dichlorophenol	ND 360	ND 340	ND 690	ND 350	ND 390
1,2,4-Trichlorobenzene	ND 360	ND 340	ND 690	ND 350	ND 390
Naphthalene	ND 360	ND 340	ND 690	ND 350	41 J
4-Chloroaniline	ND 360	ND 340	ND 690	ND 350	ND 390
Hexachlorobutadiene	ND 360	ND 340	ND 690	ND 350	ND 390
4-Chloro-3-Methylphenol	ND 360	ND 340	ND 690	ND 350	ND 390
2-Methylnaphthalene	ND 360	ND 340	ND 690	ND 350	ND 390
Hexachlorocyclopentadiene	ND 360	ND 340	ND 690	ND 350	ND 390
2,4,6-Trichlorophenol	ND 360	ND 340	ND 690	ND 350	ND 390
2,4,5-Trichlorophenol	ND 900	ND 840	ND 1700	ND 890	ND 980
2-Chloronaphthalene	ND 360	ND 340	ND 690	ND 350	ND 390
2-Nitroaniline	ND 900	ND 840	ND 1700	ND 890	ND 980
Dimethyl Phthalate	ND 360	ND 340	ND 690	ND 350	ND 390
Acenaphthylene	ND 360	ND 340	ND 690	ND 350	19 J
2,6-Dinitrotoluene	ND 360	ND 340	ND 690	ND 350	ND 390
3-Nitroaniline	ND 900	ND 840	ND 1700	ND 890	ND 980
Acenaphthene	ND 360	ND 340	ND 690	ND 350	81 J

NDx = Not detected at or above x.

J = This value is an estimate.

Table 2b Semivolatile Results
All Target Compounds
Hooker/RUCO Site
Sampled November 5, 1992

Page 2 of 2

Analytes	TB51 0-2' (SS13) ug/kg	TB51 3-5' (SS14) ug/kg	TB52 0-2' (SS15) ug/kg	TB52 0-2' (FIELD DUP) (SS16) ug/kg	TB52 3-5' (SS17) ug/kg
2,4-Dinitrophenol	ND 900	ND 840	ND 1700	ND 890	ND 980
4-Nitrophenol	ND 900	ND 840	ND 1700	ND 890	ND 980
Dibenzofuran	ND 360	ND 340	ND 690	ND 350	26 J
2,4-Dinitrotoluene	ND 360	ND 340	ND 690	ND 350	ND 390
Diethylphthalate	ND 360	ND 340	ND 690	ND 350	ND 390
4-Chlorophenyl-phenylether	ND 360	ND 340	ND 690	ND 350	ND 390
Fluorene	ND 360	ND 340	ND 690	ND 350	52 J
4-Nitroaniline	ND 900	ND 840	ND 1700	ND 890	ND 980
4,6-Dinitro-2-Methylphenol	ND 900	ND 840	ND 1700	ND 890	ND 980
N-Nitrosodiphenylamine (1)	ND 360	ND 340	ND 690	ND 350	ND 390
4-Bromophenyl-phenylether	ND 360	ND 340	ND 690	ND 350	ND 390
Hexachlorobenzene	ND 360	ND 340	ND 690	ND 350	ND 390
Pentachlorophenol	ND 900	ND 840	ND 1700	ND 890	ND 980
Phenanthrene	44 J	ND 340	80 J	64 J	290 J
Anthracene	ND 360	ND 340	ND 690	ND 350	73 J
Carbazole	ND 360	ND 340	ND 690	ND 350	55 J
Di-n-Butylphthalate	ND 360	ND 340	ND 690	ND 350	ND 390
Fluoranthene	74 J	ND 340	220 J	180 J	420
Pyrene	38 J	ND 340	150 J	190 J	200 J
Butylbenzylphthalate	ND 360	ND 340	ND 690	ND 350	ND 390
3,3'-Dichlorobenzidine	ND 360	ND 340	ND 690	ND 350	ND 390
Benzo(a)Anthracene	30 J	ND 340	110 J	94 J	150 J
Chrysene	32 J	ND 340	140 J	160 J	150 J
Bis(2-Ethylhexyl)Phthalate	69 J	ND 340	440 J	420 J	120 J
Di-n-Octyl Phthalate	ND 360	ND 340	ND 690	ND 350	ND 390
Benzo(b)Fluoranthene	33 J	ND 340	200 J	160 J	170 J
Benzo(k)Fluoranthene	ND 360	ND 340	83 J	110 J	64 J
Benzo(a)Pyrene	29 J	ND 340	140 J	130 J	110 J
Indeno(1,2,3-cd)Pyrene	ND 360	ND 340	91 J	76 J	63 J
Dibenz(a,h)Anthracene	ND 360	ND 340	ND 690	26 J	ND 390
Benzo(g,h,i)Perylene	ND 360	ND 340	93 J	70 J	54 J

(1) Cannot be separated from Diphenylamine

NDx = Not detected at or above x.

J = This value is an estimate.

Table 2c Semivolatile Results
Tentatively Identified Compounds
Hooker/RUCO Site
Sampled November 5, 1992

Compounds	TB51 0-2' (SS13) ug/kg	TB51 3-5' (SS14) ug/kg	TB52 0-2' (SS15) ug/kg	TB52 0-2' (FIELD DUP) (SS16) ug/kg	TB52 3-5' (SS17) ug/kg
Unknown (2)		250 J			
Ethanol, 2-(2-ethoxyethoxy)	460 R	440 R	440 R	460 R	500 R
Unknown (4)	490 J				
Unknown Ester	100 JN	400 JN	200 JN	140 JN	
Unknown Hydrocarbon		520 JN	400 JN		
Unknown (15)			5400 J		
Unknown (16)				3900 J	
Unknown Polyaromatic Hydrocarbon (2)				510 JN	
Unknown (3)					350 J

J = The value is an estimate.

R = The value is rejected.

JN = This analyte has been tentatively identified by
mass spectrometry as being present.

Table 3a Pesticides Results
All Target Compounds Summary
Hooker/RUCO Site
Sampled November 5, 1992

Compound	TB51 3-5' (SS14) ug/kg	TB52 0-2' (SS15) ug/kg	TB52 0-2' (FIELD DUP) (SS16) ug/kg	TB52 3-5' (SS17) ug/kg
Endosulfan I			0.89 J	
4,4'-DDE	1.3 J	3.1 J	2.5 J	
Endrin	1 J	5.8 J	5.3 J	0.81 J
Endosulfan II		1.4 J	1.1 J	
alpha-Chlordane	1.7	4.9	4.3	0.67 J
Aroclor-1248	36 J	170	120 J	39 J
Aroclor-1254	41 J	150	130	20 J

J = The value is an estimate.

Table 3b Pesticides Results
All Target Compounds
Hooker/RUCO Site
Sampled November 5, 1992

Compound	TB51 0-2' (SS13) ug/kg		TB51 3-5' (SS14) ug/kg		TB52 0-2' (SS15) ug/kg		TB52 0-2' (FIELD DUP) (SS16) ug/kg		TB52 3-5' (SS17) ug/kg	
alpha-BHC	ND	1.8	ND	1.7	ND	1.7	ND	1.8	ND	2
beta-BHC	ND	1.8	ND	1.7	ND	1.7	ND	1.8	ND	2
delta-BHC	ND	1.8	ND	1.7	ND	1.7	ND	1.8	ND	2
gamma-BHC (Lindane)	ND	1.8	ND	1.7	ND	1.7	ND	1.8	ND	2
Heptachlor	ND	1.8	ND	1.7	ND	1.7	ND	1.8	ND	2
Aldrin	ND	1.8	ND	1.7	ND	1.7	ND	1.8	ND	2
Heptachlor epoxide	ND	1.8	ND	1.7	ND	1.7	ND	1.8	ND	2
Endosulfan I	ND	1.8	ND	1.7	ND	1.7	0.89 J		ND	2
Dieldrin	ND	3.6	ND	3.4	ND	3.4	ND	3.5	ND	3.9
4,4'-DDE	ND	3.6		1.3 J		3.1 J		2.5 J	ND	3.9
Endrin	ND	3.6		1 J		5.8 J		5.3 J		0.81 J
Endosulfan II	ND	3.6	ND	3.4		1.4 J		1.1 J	ND	3.9
4,4'-DDD	ND	3.6	ND	3.4	ND	3.4	ND	3.5	ND	3.9
Endosulfan Sulfate	ND	3.6	ND	3.4	ND	3.4	ND	3.5	ND	3.9
4,4'-DDT	ND	3.6	ND	3.4	ND	3.4	ND	3.5	ND	3.9
Methoxychlor	ND	18	ND	17	ND	17	ND	18	ND	20
Endrin ketone	ND	3.6	ND	3.4	ND	3.4	ND	3.5	ND	3.9
Endrin aldehyde	ND	3.6	ND	3.4	ND	3.4	ND	3.5	ND	3.9
alpha-Chlordane	ND	1.8		1.7		4.9		4.3		0.67 J
gamma-Chlordane	ND	1.8	ND	1.7	ND	1.7	ND	1.8	ND	2
Toxaphene	ND	180	ND	170	ND	170	ND	180	ND	200
Aroclor-1016	ND	36	ND	34	ND	34	ND	35	ND	39
Aroclor-1221	ND	72	ND	67	ND	69	ND	71	ND	78
Aroclor-1232	ND	36	ND	34	ND	34	ND	35	ND	39
Aroclor-1242	ND	36	ND	34	ND	34	ND	35	ND	39
Aroclor-1248	ND	36		36 J		170		120 J		39 J
Aroclor-1254	ND	36		41 J		150		130		20 J
Aroclor-1260	ND	36	ND	34	ND	34	ND	35	ND	39

J = The value is an estimate.

NDx = Not detected at or above x.

Table 4a Metals Results
All Target Compounds Summary
Hooker/Ruco Site
Sampled November 5, 1992

Analyte	TB51 0-2'	TB51 3-5'	TB52 0-2'	TB52 0-2'	TB52 3-5'
	(SS13)	(SS14)	(SS15)	(FIELD DUP) (SS16)	(SS17)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	5900	2400	3000	2300	2100
Arsenic	3.3	3.1	1.6 B		
Barium	14 B	7.4 B	15 B	11 B	8.4 B
Beryllium	0.62 B	0.4 B	0.43 B	0.28 B	0.31 B
Calcium	2600	2800	7000	1800	4700
Chromium	8.2 J	27 J	6.1 J	4.3 J	4.9 J
Cobalt	6.2 B	2.7 B	3.2 B		2 B
Copper	13	8.6	10	13	6.9
Iron	12000	8300	8000	4300	5300
Lead	8.1 J	4.4 J	26 J	17 J	4.8 J
Magnesium	2100	1500	4400	1300	2800
Manganese	170	74	140	83	80
Mercury			0.12 J	0.31 J	
Nickel	6.5 J	2.8 J	5.5 J	3.4 J	3.2 J
Potassium	260 B	160 B	190 B	190 B	170 B
Sodium	200 J	170 J	130 J	93 B	110 J
Vanadium	19	13	15	8.5 B	10 B
Zinc	20 J		37 J	23 J	

J = The value is an estimate.

B = The value is below the method required reporting limit
but above the method detection limit.

Table 4b Metals Results
All Target Compounds
Hooker/RUCO Site

Analyte	TB51 0-2'		TB51 3-5'		TB52 0-2'		TB52 0-2' (FIELD DUP)		TB52 3-5'	
	(SS13)		(SS14)		(SS15)		(SS16)		(SS17)	
	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Aluminum		5900		2400		3000		2300		2100
Antimony	ND	6.7	ND	6.3	ND	6.5	ND	6.5	ND	6.5
Arsenic		3.3		3.1		1.6 B	ND	0.84	ND	0.83
Barium		14 B		7.4 B		15 B		1.1 B		8.4 B
Beryllium		0.62 B		0.4 B		0.43 B		0.28 B		0.31 B
Cadmium	ND	0.65	ND	0.61	ND	0.63	ND	0.63	ND	0.63
Calcium		2600		2800		7000		1800		4700
Chromium		8.2 J		27 J		6.1 J		4.3 J		4.9 J
Cobalt		6.2 B		2.7 B		3.2 B	ND	1.5		2 B
Copper		13		8.6		10		13		6.9
Iron		12000		8300		8000		4300		5300
Lead		8.1 J		4.4 J		26 J		17 J		4.8 J
Magnesium		2100		1500		4400		1300		2800
Manganese		170		74		140		83		80
Mercury	ND	0.11	ND	0.1		0.12 J		0.31 J	ND	0.1
Nickel		6.5 J		2.8 J		5.5 J		3.4 J		3.2 J
Potassium		260 B		160 B		190 B		190 B		170 B
Selenium	ND	0.43	ND	0.41	ND	0.42	ND	0.42	ND	0.42
Silver	ND	1.1	ND	1	ND	1.1	ND	1.1	ND	1
Sodium		200 J		170 J		130 J		93 B		110 J
Thallium	ND	0.86	ND	0.82	ND	0.84	ND	0.84	ND	0.83
Vanadium		19		13		15		8.5 B		10 B
Zinc		20 J	ND	13		37 J		23 J	ND	14
Cyanide	ND	0.54	ND	0.51	ND	0.53	ND	0.53	ND	0.52

NDx = Not detected at or above x.

J = The value is an estimate.

B = The value is below the method required reporting limit
but above the method detection limit.

Table 5a Volatile
Duplicate Data %RPD
Hooker/RUCO Site

Compound	TB51 3-5' (SS14MS) ug/kg	TB51 3-5' (SS14MSD) ug/kg	%RPD
1,1-Dichloroethene	49	58	17
Trichloroethene	54	54	0
Benzene	44	45	2
Toluene	49	49	0
Chlorobenzene	52	52	0

Table 5b Volatile Analysis
Water Surrogate Recovery Data Summary
Hooker/RUCO Site

Field ID	EPA Sample No.	SMC1 (TOL)%	SMC2 (BFB)%	SMC3 (DCE)%
Field Blank 001	(SS11)	102	99	94
Field Blank 002	(SS12)	102	97	91
	VLK1	104	100	94

Acceptance Criteria

QC Limits

SMC1 (TOL) = Toluene-d8

(88-110)

SMC2 (BFB) = Bromofluorobenzene

(86-115)

SMC3 (DCE) = 1,2-Dichloroethane-d4

(76-114)

Table 5c Volatile Analysis
Soil Surrogate Recovery Data Summary
Hooker/RUCO Site

Field ID	EPA Sample No.	SMC1 (TOL)%	SMC2 (BFB)%	SMC3 (DCE)%
TB51 0-2'	(SS13)	100	77	74
TB51 3-5'	(SS14)	96	78	80
TB51 3-5'	(SS14MS)	94	78	64
TB51 3-5'	(SS14MSD)	94	78	80
TB52 0-2'	(SS15)	95	77	80
TB52 0-2' (FIELD DUP)	(SS16)	97	76	75
TB52 3-5'	(SS17)	97	77	72
	VBLK2	99	83	80

Acceptance Criteria

SMC1 (TOL) = Toluene-d8
SMC2 (BFB) = Bromofluorobenzene
SMC3 (DCE) = 1,2-Dichloroethane-d4

QC Limits

(84-138)
(59-113)
(70-121)

Table 5d Volatile Blank Data
All Target Compounds
Hooker/RUCO Site

Compound	VBLK1 ug/L (Water)	VBLK2 ug/kg (Soil)
Chloromethane	ND 10	ND 10
Bromomethane	ND 10	ND 10
Vinyl Chloride	ND 10	ND 10
Chloroethane	ND 10	ND 10
Methylene Chloride	4 J	ND 10
Acetone	ND 10	ND 10
Carbon Disulfide	ND 10	ND 10
1,1-Dichloroethene	ND 10	ND 10
1,1-Dichloroethane	ND 10	ND 10
1,2-Dichloroethene(total)	ND 10	ND 10
Chloroform	ND 10	ND 10
1,2-Dichloroethane	ND 10	ND 10
2-Butanone	ND 10	ND 10
1,1,1-Trichloroethane	ND 10	ND 10
Carbon Tetrachloride	ND 10	ND 10
Bromodichloromethane	ND 10	ND 10
1,2-Dichloropropane	ND 10	ND 10
cis-1,3-Dichloropropene	ND 10	ND 10
Trichloroethene	ND 10	ND 10
Dibromochloromethane	ND 10	ND 10
1,1,2-Trichloroethane	ND 10	ND 10
Benzene	ND 10	ND 10
trans-1,3-Dichloropropene	ND 10	ND 10
Bromoform	ND 10	ND 10
4-Methyl-2-Pentanone	ND 10	ND 10
2-Hexanone	ND 10	ND 10
Tetrachloroethene	ND 10	ND 10
1,1,2,2-Tetrachloroethane	ND 10	ND 10
Toluene	ND 10	ND 10
Chlorobenzene	ND 10	ND 10
Ethylbenzene	ND 10	ND 10
Styrene	ND 10	ND 10
Xylene (total)	ND 10	ND 10

NDx = Not detected at or above x.

J = The value is an estimate.

Table 6a Semivolatile
Duplicate Data %RPD
Hooker/RUCO Site

Compounds	TB51 3-5' (SS14MS) ug/kg	TB51 3-5' (SS14MSD) ug/kg	%RPD
Phenol	1400	1400	0
2-Chlorophenol	1300	1400	7
1,4-Dichlorobenzene	890	920	4
N-Nitroso-Di-n-Propylamine	890	900	2
1,2,4-Trichlorobenzene	950	920	4
4-Chloro-3-Methylphenol	1400	1400	0
Acenaphthene	930	970	4
4-Nitrophenol	1600	1700	6
2,4-Dinitrotoluene	990	1000	2
Pentachlorophenol	1600	1600	0
Pyrene	790	810	4

Table 6b Semivolatile Analysis
Soil Surrogate Recovery Data
Hooker/RUCO Site

Field ID	EPA Sample No.	S1 (NBZ)%	S2 (FBP)%	S3 (TPH)%	S4 (PHL)%	S5 (2FP)%	S6 (TBP)%	S7 (2CP)%	S8 (DCB)%
	SBLK2	53	50	49	56	48	56	64	52
B51 0-2'	(SS13)	54	55	54	56	52	74	67	55
B51 3-5'	(SS14)	53	54	49	55	51	71	63	53
TB51 3-5'	(SS14MS)	53	54	49	55	51	71	63	55
B51 3-5'	(SS14MSD)	52	54	51	55	51	71	63	54
B52 0-2'	(SS15)	57	63	68	62	58	78	74	57
TB52 0-2' (FIELD DUP)	(SS16)	61	66	88	64	60	98	71	61
B52 3-5'	(SS17)	55	60	55	58	54	75	68	55

Acceptance Criteria

QC Limits

S1 (NBZ) = Nitrobenzene-d5	(23-120)
S2 (FBP) = 2-Fluorobiphenyl	(30-115)
S3 (TPH) = Terphenyl-d14	(18-137)
S4 (PHL) = Phenol-d5	(24-113)
S5 (2FP) = 2-Fluorophenol	(25-121)
S6 (TBP) = 2,4,6-Tribromophenol	(19-122)
S7 (2CP) = 2-Chlorophenol-d4	(20-130) (advisory)
S8 (DCB) = 1,2-Dichlorobenzene-d14	(20-130) (advisory)

Table 6c Semivolatile Analysis
Water Surrogate Recovery Data
Hooker/RUCO Site

Field ID	EPA Sample No.	S1 (NBZ)%	S2 (FBP)%	S3 (TPH)%	S4 (PHL)%	S5 (2FP)%	S6 (TBP)%	S7 (2CP)%	S8 (DCB)%
	SBLK1	50	46	58	51	48	64	57	42
FIELD BLANK 001	(SS11)	52	50	54	53	48	67	61	46
FIELD BLANK 002	(SS12)	54	50	58	56	52	68	64	48

Acceptance Criteria

S1 (NBZ) = Nitrobenzene-d5
S2 (FBP) = 2-Fluorobiphenyl
S3 (TPH) = Terphenyl-d14
S4 (PHL) = Phenol-d5
S5 (2FP) = 2-Fluorophenol
S6 (TBP) = 2,4,6-Tribromophenol
S7 (2CP) = 2-Chlorophenol-d4
S8 (DCB) = 1,2-Dichlorobenzene-d14

QC Limits

(35-114)
(43-116)
(33-141)
(10-110)
(21-110)
(10-123)
(33-110) (advisory)
(16-110) (advisory)

Table 6d Semivolatile Blank Data
All Target Compounds
Hooker/RUCO Site

Compound	SBLK1 ug/L (Water)	SBLK2 ug/kg (Soil)
Phenol	ND 10	ND 330
bis(2-Chloroethyl)ether	ND 10	ND 330
2-Chlorophenol	ND 10	ND 330
1,3-Dichlorobenzene	ND 10	ND 330
1,4-Dichlorobenzene	ND 10	ND 330
1,2-Dichlorobenzene	ND 10	ND 330
2-Methylphenol	ND 10	ND 330
2,2'-oxybis(1-Chloropropane)	ND 10	ND 330
4-Methylphenol	ND 10	ND 330
N-Nitroso-di-n-propylamine	ND 10	ND 330
Hexachloroethane	ND 10	ND 330
Nitrobenzene	ND 10	ND 330
Isophorone	ND 10	ND 330
2-Nitrophenol	ND 10	ND 330
2,4-Dimethylphenol	ND 10	ND 330
bis(2-Chloroethoxy)methane	ND 10	ND 330
2,4-Dichlorophenol	ND 10	ND 330
1,2,4-Trichlorobenzene	ND 10	ND 330
Naphthalene	ND 10	ND 330
4-Chloroaniline	ND 10	ND 330
Hexachlorobutadiene	ND 10	ND 330
4-Chloro-3-methylphenol	ND 10	ND 330
2-Methylnaphthalene	ND 10	ND 330
Hexachlorocyclopentadiene	ND 10	ND 330
2,4,6-Trichlorophenol	ND 10	ND 330
2,4,5-Trichlorophenol	ND 25	ND 830
2-Chloronaphthalene	ND 10	ND 330
2-Nitroaniline	ND 25	ND 830
Dimethylphthalate	ND 10	ND 330
Acenaphthylene	ND 10	ND 330
2,6-Dinitrotoluene	ND 10	ND 330
3-Nitroaniline	ND 25	ND 830
Acenaphthene	ND 10	ND 330

NDx = Not detected at or above x.

Table 6d Semivolatile Blank Data
All Target Compounds
Hooker/RUCO Site

Compound	SBLK1 ug/L (Water)	SBLK2 ug/kg (Soil)
2,4-Dinitrophenol	ND 25	ND 830
4-Nitrophenol	ND 25	ND 830
Dibenzofuran	ND 10	ND 330
2,4-Dinitrotoluene	ND 10	ND 330
Diethylphthalate	ND 10	ND 330
4-Chlorophenyl-phenylether	ND 10	ND 330
Fluorene	ND 10	ND 330
4-Nitroaniline	ND 25	ND 830
4,6-Dinitro-2-methylphenol	ND 25	ND 830
N-Nitrosodiphenylamine (1)	ND 10	ND 330
4-Bromophenyl-phenylether	ND 10	ND 330
Hexachlorobenzene	ND 10	ND 330
Pentachlorophenol	ND 25	ND 830
Phenanthrene	ND 10	ND 330
Anthracene	ND 10	ND 330
Carbazole	ND 10	ND 330
Di-n-butylphthalate	0.7 J	24 J
Fluoranthene	ND 10	ND 330
Pyrene	ND 10	ND 330
Butylbenzylphthalate	ND 10	ND 330
3,3'-Dichlorobenzidine	ND 10	ND 330
Benzo(a)anthracene	ND 10	ND 330
Chrysene	ND 10	ND 330
bis(2-Ethylhexyl)phthalate	ND 10	ND 330
Di-n-octylphthalate	ND 10	ND 330
Benzo(b)fluoranthene	ND 10	ND 330
Benzo(k)fluoranthene	ND 10	ND 330
Benzo(a)pyrene	ND 10	ND 330
Indeno(1,2,3-cd)pyrene	ND 10	ND 330
Dibenz(a,h)anthracene	ND 10	ND 330
Benzo(g,h,i)perylene	ND 10	ND 330

(1) Cannot be separated from dephenylamine.

NDx = Not detected at or above x.

J = The value is an estimate.

Table 7a Pesticide
Duplicate Data %RPD
Hooker/RUCO Site

Compound	TB51 3-5' (SS14MS) ug/kg	TB51 3-5' (SS14MSD) ug/kg	%RPD
gamma-BHC (Lindane)	16	17	6
Heptachlor	13	18	33
Aldrin	13	14	8
Dieldrin	37	37	0
Endrin	37	38	3
4,4'-DDT	33	33	0

Table 7b Pesticide Analysis
Water Surrogate Recovery Data Summary
Hooker/RUCO Site

Field ID	EPA Sample No.	TCX1 %REC	TCX2 %REC	DCB1 %REC	DCB2 %REC
	PBLK1	100	85	90	85
	PIBLKB1	110	100	110	110
	PIBLKB2	110	95	100	105
	PIBLKB3	95	95	105	100
	PIBLKB4	90	90	105	100
	PIBLKB5	100	95	105	105
	PIBLKB6	135	110	110	110
Field Blank 001	(SS11)	110	85	95	90
Field Blank 002	(SS12)	115	90	85	85

Acceptance Criteria

TCX = Tetrachloro-m-xylene
DCB = Decachlorobiphenyl

QC Limits

(60-150)
(60-150)

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Table 7c Pesticide Analysis
Soil Surrogate Recovery Data Summary
Hooker/RUCO Site

Field ID	EPA Sample No.	TCX1 %REC	TCX2 %REC	DCB1 %REC	DCB2 %REC
	PBLKII	98	90	83	83
TB51 0-2'	(SS13)	48 *	41 *	41 *	41 *
TB51 3-5'	(SS14)	104	89	89	82
TB51 3-5'	(SS14MS)	104	97	97	82
TB51 3-5'	(SS14MSD)	104	97	97	82
TB52 0-2'	(SS15)	102	109	109	63
TB52 0-2' (FIELD DUP)	(SS16)	99	106	69	62
TB52 3-5'	(SS17)	102	96	70	59 *

Acceptance Criteria

TCX = Tetrachloro-m-xylene
DCB = Decachlorobiphenyl

QC Limits

(60-150)
(60-150)

* = Values outside of QC limits

Table 7d Pesticide Blank Data
All Target Compounds
Hooker/RUCO Site

Page 1 of 2

Compound	PBLKI ug/L		PBLKII ug/L		PIBLKB1 ug/L		PIBLKB2 ug/L	
alpha-BHC	ND	0.05	ND	1.7	ND	0.025	ND	0.025
beta-BHC		0.017 JP	ND	1.7	ND	0.025	ND	0.025
delta-BHC	ND	0.05	ND	1.7	ND	0.025	ND	0.025
gamma-BHC (Lindane)	ND	0.05	ND	1.7	ND	0.025	ND	0.025
Heptachlor	ND	0.05	ND	1.7	ND	0.025	ND	0.025
Aldrin	ND	0.05	ND	1.7	ND	0.025	ND	0.025
Heptachlor epoxide	ND	0.05	ND	1.7	ND	0.025	ND	0.025
Endosulfan I	ND	0.05	ND	1.7	ND	0.025	ND	0.025
Dieldrin	ND	0.1	ND	3.3	ND	0.05	ND	0.05
4,4'-DDE	ND	0.1	ND	3.3	ND	0.05	ND	0.05
Endrin	ND	0.1	ND	3.3	ND	0.05	ND	0.05
Endosulfan II	ND	0.1	ND	3.3	ND	0.05	ND	0.05
4,4'-DDD	ND	0.1	ND	3.3	ND	0.05	ND	0.05
Endosulfan sulfate	ND	0.1	ND	3.3	ND	0.05	ND	0.05
4,4'-DDT	ND	0.1	ND	3.3	ND	0.05	ND	0.05
Methoxychlor	ND	0.5		4.7 JP	ND	0.25	ND	0.25
Endrin ketone	ND	0.1	ND	3.3	ND	0.05	ND	0.05
Endrin aldehyde	ND	0.1	ND	3.3	ND	0.05	ND	0.05
alpha-Chlordane	ND	0.05	ND	1.7	ND	0.025	ND	0.025
gamma-Chlordane	ND	0.05	ND	1.7	ND	0.025	ND	0.025
Toxaphene	ND	5	ND	170	ND	2.5	ND	2.5
Aroclor-1016	ND	1	ND	33	ND	0.5	ND	0.5
Aroclor-1221	ND	2	ND	67	ND	1	ND	1
Aroclor-1232	ND	1	ND	33	ND	0.5	ND	0.5
Aroclor-1242	ND	1	ND	33	ND	0.5	ND	0.5
Aroclor-1248	ND	1	ND	33	ND	0.5	ND	0.5
Aroclor-1254	ND	1	ND	33	ND	0.5	ND	0.5
Aroclor-1260	ND	1	ND	33	ND	0.5	ND	0.5

NDx = Not detected at or above x.

J = The value is an estimate.

P = %D >25%

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Table 7d Pesticide Blank Data
All Target Compounds
Hooker/RUCO Site

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Compound	IBLKB3 ug/L		PIBLKB4 ug/L		PIBLKB5 ug/L		PIBLKB6 ug/L	
alpha-BHC	ND	0.025	ND	0.025	ND	0.025	ND	0.025
beta-BHC	ND	0.025	ND	0.025	ND	0.025	ND	0.025
delta-BHC	ND	0.025	ND	0.025	ND	0.025	ND	0.025
gamma-BHC (Lindane)	ND	0.025	ND	0.025	ND	0.025	ND	0.025
Heptachlor	ND	0.025	ND	0.025	ND	0.025	ND	0.025
Aldrin	ND	0.025	ND	0.025	ND	0.025	ND	0.025
Heptachlor epoxide	ND	0.025	ND	0.025	ND	0.025	ND	0.025
Endosulfan I	ND	0.025	ND	0.025	ND	0.025	ND	0.025
Dieldrin	ND	0.05	ND	0.05	ND	0.05	ND	0.05
4,4'-DDE	ND	0.05	ND	0.05	ND	0.05	ND	0.05
Endrin	ND	0.05	ND	0.05	ND	0.05	ND	0.05
Endosulfan II	ND	0.05	ND	0.05	ND	0.05	ND	0.05
4,4'-DDD	ND	0.05	ND	0.05	ND	0.05	ND	0.05
Endosulfan sulfate	ND	0.05	ND	0.05	ND	0.05	ND	0.05
4,4'-DDT	ND	0.05	ND	0.05	ND	0.05	ND	0.05
Methoxychlor	ND	0.25	ND	0.25	ND	0.25	ND	0.25
Endrin ketone	ND	0.05	ND	0.05	ND	0.05	ND	0.05
Endrin aldehyde	ND	0.05	ND	0.05	ND	0.05	ND	0.05
alpha-Chlordane	ND	0.025	ND	0.025	ND	0.025	ND	0.025
gamma-Chlordane	ND	0.025	ND	0.025	ND	0.025	ND	0.025
Toxaphene	ND	2.5	ND	2.5	ND	2.5	ND	2.5
Aroclor-1016	ND	0.5	ND	0.5	ND	0.5	ND	0.5
Aroclor-1221	ND	1	ND	1	ND	1	ND	1
Aroclor-1232	ND	0.5	ND	0.5	ND	0.5	ND	0.5
Aroclor-1242	ND	0.5	ND	0.5	ND	0.5	ND	0.5
Aroclor-1248	ND	0.5	ND	0.5	ND	0.5	ND	0.5
Aroclor-1254	ND	0.5	ND	0.5	ND	0.5	ND	0.5
Aroclor-1260	ND	0.5	ND	0.5	ND	0.5	ND	0.5

NDx = Not detected at or above x.

Table 8a Metals
Duplicate Data %RPD
Hooker/RUCO Site

Analyte	TB51 3-5' (SS14) mg/kg	TB51 3-5' (SS14D) mg/kg	%RPD
Aluminum	2400	2500	7
Antimony	ND 6.3	ND 6.3	
Arsenic	3.1	ND 0.8	200
Barium	7.4 B	6.9 B	6.9
Beryllium	0.4 B	ND 0.3	24
Cadmium	ND 0.6	ND 0.6	
Calcium	2800	2700	2.5
Chromium	27	6	130
Cobalt	2.7 B	4 B	38
Copper	8.6	7.7	11
Iron	8300	6000	33
Lead	4.4	4.5	1.8
Magnesium	1500	1500	5.4
Manganese	74	96	26
Mercury	ND 0.1	0.11	200
Nickel	2.8 B	11	120
Potassium	160	160	1.3
Selenium	ND 0.41	ND 0.41	
Silver	ND 1	ND 1	
Sodium	170	160	6
Thallium	ND 0.8	ND 0.8	
Vanadium	13	11	15
Zinc	13	47	110
Cyanide	ND 0.5	ND 0.5	

NDx = Not detected at or above x.

B = The value is below the method required reporting limit
but above the method detection limit.

Table 8b Metals
Matrix Spike Analysis
Hooker/RUCO Site

Analyte	Sample TB51 3-5' (SS14) mg/kg	Amount Spiked mg/kg	Amount Found TB51 3-5' (SS14S) mg/kg	% Recovery
Antimony	ND 6.3	100	69	68
Arsenic	3.1	8.2	9.4	78
Barium	7.4	410	390	94
Beryllium	0.4 B	10	9.7	91
Cadmium	ND 0.6	10	8.9	87
Chromium	27	41	40	33
Cobalt	2.7 B	100	100	97
Copper	8.6	51	55	92
Lead	4.4	4.1	6.7	55
Manganese	74	100	170	97
Mercury	ND 0.1	0.44	0.67	150
Nickel	2.8 B	100	98	93
Selenium	ND 0.4	2	2.2	110
Silver	ND 1	10	9	88
Thallium	ND 0.8	10	9.6	94
Vanadium	13	100	114	99
Zinc	13	100	110	93
Cyanide	ND 0.5	5.1	5.1	100

NDx = Not detected at or above x.

B = The value is below the method required reporting limit
but above the method detection limit.

Table 8c Metals Laboratory Control Spike
All Target Elements
Hooker/RUCO Site

Analyte	Percent Recovery
Aluminum	79
Antimony	90
Arsenic	110
Barium	110
Beryllium	95
Cadmium	84
Calcium	78
Chromium	92
Cobalt	95
Copper	91
Iron	89
Lead	110
Magnesium	89
Manganese	94
Mercury	77
Nickel	89
Potassium	95
Selenium	77
Silver	90
Sodium	130
Thallium	120
Vanadium	100
Zinc	96
Cyanide	100

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